

FUJI 18.868
09/931,656In the Claims:

Please amend the claims as follows:

1. (presently amended) A TCP local retransmission scheme, used in an unreliable network, is comprised of characterized in the following steps:

A. ~~When the~~ when an access point of an unreliable link receives a new TCP data packet from an Internet TCP source, ~~it inserts the~~ said access point inserting into said data packet, an LAC-PDU head with a time-stamp of a first local sequence number. ~~The~~ said data packet is encapsulated ~~to a~~ as an LAC-PDU packet comprising as "LAC-PDU head + IP head + TCP head + Data", ~~then is delivered to the current terminal;~~

B. ~~When the current terminal successfully receives a TCP data packet, it produces~~ delivering said data packet to a current terminal; said current terminal producing an acknowledgement packet (ACK1) ~~which includes comprising~~ comprising an acknowledgement number (AN) when said current terminal successfully receives a TCP data packet; said current terminal; ~~It is~~ also inserted a inserting to said LAC-PDU head, with a time-stamp of a second local sequence number such that said, i.e. the acknowledgement packet is encapsulated as an to a LAC-PDU acknowledgement packet and is delivered back to said the access point of an unreliable link;

C. ~~At the~~ at said access point of an unreliable link, ~~detecting a~~ detection of whether there is a data packet loss based on said time-stamp of a first local sequence number, stored in said access point, ~~said is made.~~ This is according to the Acknowledgement Number acknowledgment number (AN) and, the Time-stamp said time-stamp of a second local sequence number, wherein both are determined received from said the acknowledgement packet package, and the Time- stamp of first local sequence number, which is stored in the access point; and

D. ~~if~~ If a lost data packet is detected, updating and retransmitting as step A procedure; updates its said time-stamp of a first local sequence number in LAC-PDU head, and retransmits;

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~~When, and when congestion loss of the data packet which corresponds to said acknowledgement number (AN) of acknowledgement packet (ACK1) is impossible, which corresponds to the acknowledgement number (AN) of acknowledgement packet, the said acknowledgement packet (ACK1); with along with a marked explicit retransmission feedback (ERN) field marked, is delivered to said Internet the-TCP source.~~

2. (presently amended) A TCP local retransmission scheme, used in an unreliable network, as per claim 1, wherein a copy of said encapsulated LAC-PDU data packet is stored in a buffer at the time. ~~According to claim 1, which mentions a TCP local retransmission scheme used in an unreliable network, the characteristic is as follows. In step A mentioned above, when a an LAC-PDU head is inserted with said time-stamp of a first local sequence number is inserted, a copy of the encapsulated LAC-PDU data packet is stored in a buffer at the same time.~~

3. (presently amended) A TCP local retransmission scheme, used in an unreliable network, as per claim 1, wherein ~~said~~ According to claim 1, which mentions TCP local retransmission scheme used in unreliable network, the characteristic is as follows. The time-stamp of a first local sequence number, mentioned above, is fix length is a fixed-length bit field which increases sequentially. Along with delivered data packet increases, starting from zero 0 with a +a step length of one as data packets are received its value increases sequentially.

4. (presently amended) A TCP local retransmission scheme, used in an unreliable network, as per claim 1, wherein ~~According to claim 1, which mentions TCP local retransmission scheme used in unreliable network, the characteristic is as follows. During the whole delivery process from access point to terminal, the real delivery sequence is uniquely determined by the said time-~~

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stamp value of a first local sequence number in of said TCP data packet during delivery from
said access point to said current terminal.

5. (presently amended) A TCP local retransmission scheme, used in an unreliable network, as
per claim 1, wherein said According to claim 1, which mentions TCP local retransmission
scheme used in unreliable network, the characteristic is as follows.—The time-stamp of a second
local sequence number, mentioned above, is also a fix length is a fixed-length bit field.—It records
recording the maximum value attained by said of time-stamp of a first local sequence number
among all the successfully received TCP data packets successfully received at said in the current
terminal.

6. (presently amended) A TCP local retransmission scheme, used in an unreliable network, as
per claim 1, wherein According to claim 1, which mentions TCP local retransmission scheme
used in unreliable network, the characteristic is as follows.—As mention above at access point of
unreliable link, a lost data packet is detected according to the based on said acknowledgement
number (AN), the said time-stamp of a second local sequence number, both determined comes
from said received acknowledgement packet, and the said time-stamp of a first local sequence
number, which is stored at said the access point; wherein said.—Further more, detection is made
for determining whether the a data packet corresponding, which corresponds to said the
acknowledgement number (AN) of acknowledgement packet[[.]] is still in the at said access
point of unreliable link, if it is and if so, a comparison between two time-stamps is made[[.]];

A. said.—The comparison is made between time-stamps the time-stamp of a first local
sequence number in said received the data packet and the time-stamp of a second local sequence
number in said the acknowledgement packet[[.]];

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B. wherein if said time-stamp of a first local sequence number is less than said time-stamp of a second local sequence number, a the lost data packet is detected; and

C. then the said time-stamp of a first local sequence number at the LAC-PDU head is updated; said lost and the data packet is retransmitted; and at said. In addition, in the access point of unreliable link, the data packets[[,]] for which the time-stamp of a first local sequence number is less than an associated the acknowledgement number (AN)[[,]] are all deleted.

7. (presently amended) A TCP local retransmission scheme, used in an unreliable network, as per claim 6, wherein said According to claim 6, which mentions a TCP local retransmission scheme used in unreliable network, the characteristic is as follows. The update of the time-stamp of a first local sequence number at the LAC-PDU data packet head of data packet, mentioned above, substitutes said the time-stamp of a first local sequence number with a the current delivery sequence; then and then, retransmits said data packet.

8. (presently amended) A TCP local retransmission scheme, used in an unreliable network, as per claim 6, wherein According to claim 6, which mentions a TCP local retransmission scheme used in unreliable network, the characteristic is as follows. As mentioned above, in the access point of unreliable link, the data packets[[,]] for which a TCP sequence number is less than an associated the acknowledgement number, are all detected at the following situations. They are indicates that either:

a data packet, which corresponds to said acknowledgement number (AN) of

acknowledgement packet, is not in said the access point of unreliable link; or

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said the time-stamp of a first local sequence number is either equal to or greater than said the time-stamp of a second local sequence number;
after lost data packet is detected, updated and, and retransmitted.

9. (presently amended) A TCP local retransmission scheme, used in an unreliable network, as per claim 6, wherein when said ~~According to claim 6, which mentions a TCP local retransmission scheme used in unreliable network, the characteristic is as follows. The explicit retransmission (ERN) feedback, mentioned above, is an one bit field. When the data packet[[,]] corresponding to said the acknowledgement number (AN)[[,]] in said the access point of unreliable link is detected, the an explicit retransmission (ERN) feedback bit of said acknowledgement packet (ACK1), which is to be sent to a TCP source, is set:--When; and when, said TCP source receives said an acknowledgement packet (ACK1) with explicit retransmission (ERN) feedback bit set[[,]] at the same time that either of: fast retransmission or timeout retransmission of said the TCP data packet corresponding to said acknowledgement packet (ACK1) occurs, said happen, which corresponds to the acknowledgement packet (ACK1), only the data packet is retransmitted without a corresponding any-shrink operation of send window of said TCP source; and wherein said explicit retransmission (ERN) feedback is a one-bit field, the sending window.~~

10. (presently amended) A TCP local retransmission scheme, used in an unreliable network, as per claim 1, wherein said ~~According to claim 1, which mentions a TCP local retransmission scheme used in unreliable network, the characteristic is as follows. The mentioned above time-stamp length[[,]] for either a first local sequence number or a second local sequence number, is~~

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the maximum ~~packet~~ number of data packets that can be buffered at ~~said the~~ access point of unreliable link.

11. (presently amended) A TCP local retransmission scheme, used in an unreliable network, as per claim 1, wherein said ~~According to claim 1, which mentions a TCP local retransmission scheme used in unreliable network, the characteristic is as follows. The mentioned above time-stamp length for either a first local sequence or a second local sequence number~~ [[,]] is an eight-bit eight bits field; and wherein one of said eight bits is designated as a, including one carry bit for overflow.

12. (presently amended) A TCP local retransmission scheme, used in an unreliable network, as per claim 1, wherein said ~~According to claim 1, which mentions a TCP local retransmission scheme used in unreliable network, the characteristic is as follows. In mentioned step A, in LAC-PDU data packet the time-stamp of a first local sequence number of said LAC-PDU data packet is may be substituted with a by lower layer transfer sequence number~~ [[,]]; said substitution establishing and a corresponding relationship between the sequence number of said TCP data packet and its lower layer transfer sequence number and wherein said is created. With this substitution, in mentioned step B, the time-stamp of a second local sequence number is the successfully maximum successfully transferred lower layer transfer sequence number in said current the terminal.

13. (presently amended) A TCP local retransmission scheme, used in an unreliable network, the characteristic is as follows: Method of comprised of: transmitting a data packet for a mobile Mobile communication system; said mobile communication system receiving said which

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receives the data packet including sequence number from at least one Internet Networks network
and ~~transmits~~ transmitting said the data packet to a mobile terminal; ~~said transmitting said~~
~~transmission method comprising the steps of:~~

receiving a new data packet from said at least one Internet Network network;

giving a time-stamp of a first local sequence number to the each of said received
data packets packet;

~~forming the formatting said received data packets in accordance with said packet data to a~~
~~format using in the mobile communication system with said the given time-stamp of a first local~~
~~sequence number;~~

buffering said data packet the packet data with the given time-stamp;

~~transmitting the formed packet data to the said formatted data packet to said~~
~~mobile terminal and sending back acknowledgement data from said the mobile terminal~~[[
,]]when said the mobile terminal successfully receives the transmitted ~~packet data data packet~~,
which includes an acknowledgement number and the a time-stamp of second local sequence
number corresponding to the received said time-stamp of a first local sequence number;

detecting ~~whether said the data packet which should be retransmitted to said the mobile~~
~~terminal by comparing a the buffered sequence number and said the time-stamp of a first~~
~~sequence number associated with said with the sent back acknowledgement data received from~~
~~said mobile terminal; and~~

retransmitting said the detected data packet, if determined necessary in said detecting
step.

14. (presently amended) A TCP local retransmission scheme, used in an unreliable network, as
per claim 13. According to claim 13, which mentions a TCP local retransmission scheme used in

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~~unreliable network; the characteristic is as follows: Method of transmitting a data packet,~~
~~wherein said mobile communication system comprising includes a server[[,]]; said server giving~~
~~said said server gives the time-stamp of a first local sequence number to the each of said received~~
~~data packets, formatting said data packet, forms the packet in manner used by said data to the~~
~~format using in the mobile communication system with the said given time-stamp of first local~~
~~sequence number and ; and buffering said buffers the packet data packet along with said given~~
~~the time stamp.~~

15. (presently amended) A TCP local retransmission scheme, used in an unreliable network, the characteristic is as follows: wherein a method Method of receiving a data packet from a mobile of Mobile terminal in a mobile Mobile communication system comprises:

- a. which receives receiving said data packet comprising a including sequence number from at least one Internet network Networks and transmits transmitting said the data packet to said the mobile terminal; said reception comprising: receiving method comprising the steps of:
- b. receiving said a new data packet which is formed to a format formatted in accordance with said using in the mobile communication system, said the formed the formatted data packet comprising a includes a time-stamp of a first local sequence number;
- c. giving a time-stamp of a second local sequence number corresponding to said the received time-stamp of a first local sequence number; and
- d. sending back [[a]] acknowledgment data comprising which includes an acknowledgement number and said the given time-stamp of a second local sequence number corresponding to the said received time-stamp of a first local sequence number.